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## ABSTRACT

To determine the repercussions of scientific and technological progress on the employment of women and their conditions of work, the Women's Bureau used available statistical data from 1958-68 to study: (1) Employment and Unemployment, (2) Vocational Guidance and Training, (3) Training and Retraining of Older Women, (4) Remuneration, (5) Hours of Work and Leisure, (6) Safety and Health, and (7) Child Care. Some major findings were: (1) In 1968 more women were engaged in office and service work (excluding household work) and relatively fewer in farm, sales, and factory work, (2) For women in professional and service work, the influence of automation has been less pronounced than for those in clerical, factory, sales, and farm jobs, (3) The declining importance of some occupations has emphasized the urgent need to update and extend the vocational guidance and training provided women and girls, (4) Because of scientific and technological changes, many older women interested in working have found it necessary to resume education and training, and (5) Technological advances appear to have had virtually no influence on the provision of child care. (SB)

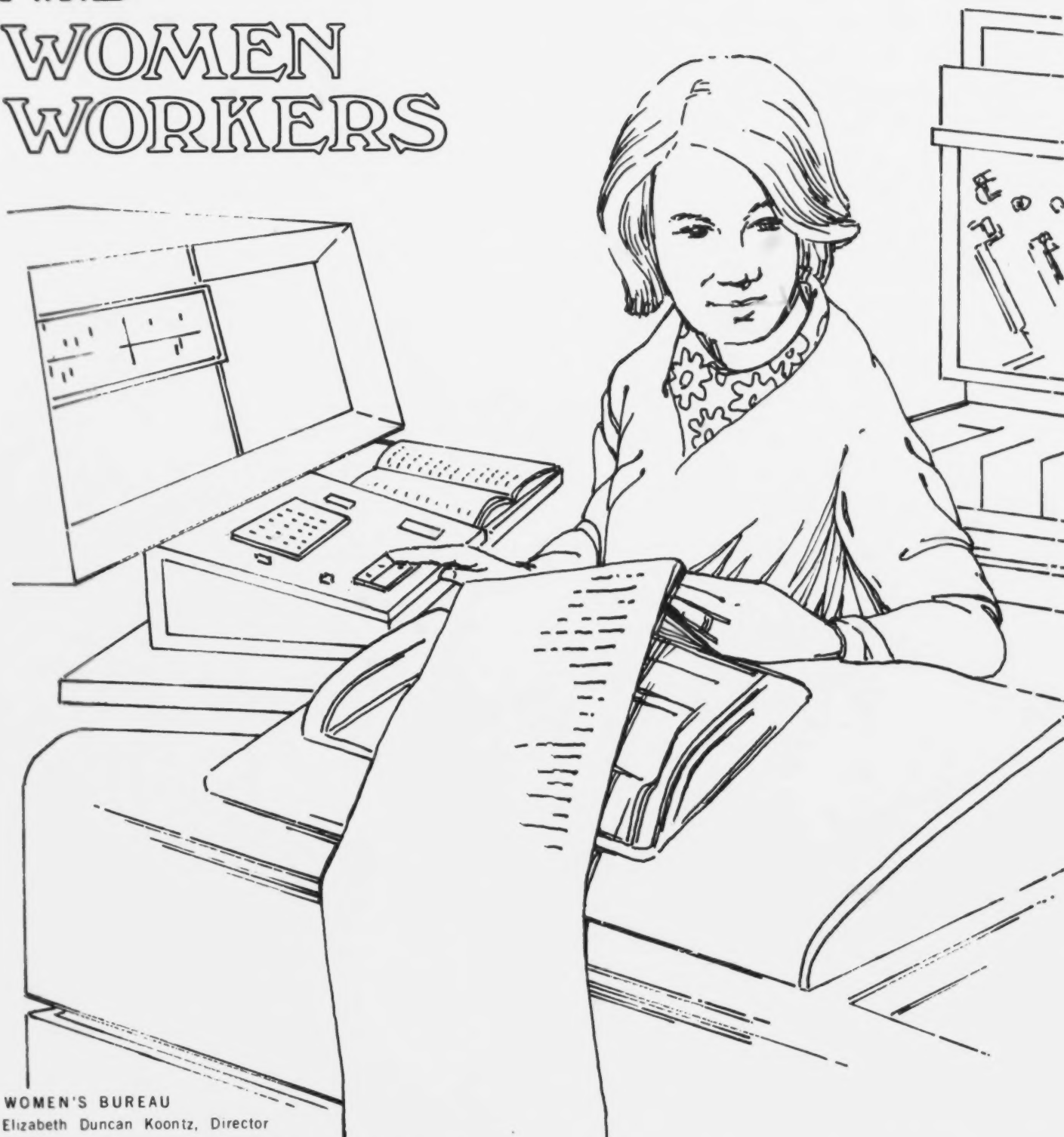
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# AUTOMATION AND WOMEN WORKERS

U.S. DEPARTMENT OF HEALTH, EDUCATION  
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## FOREWORD

Dynamic technological developments of the late fifties and early sixties brought predictions that men and women workers would be widely displaced by machines. Some forecasters thought that the job outlook was especially bleak for the many women performing unskilled and semi-skilled work that might be automated. As the Nation's economic growth quickened and the rate of unemployment declined in the middle sixties, the public gave less attention to advancing automation and its possible adverse effects.

Continuing interest by the United Nations Commission on the Status of Women in special implications of technology for women workers, however, prompted the Commission to recommend studies by member nations of the repercussions of scientific and technological progress on the employment of women and their conditions of work. The Commission named as its specific areas of interest: employment and unemployment, vocational guidance and training, training and retraining of older women, remuneration, hours of work and leisure, safety and health, and child care.

This report prepared by the Women's Bureau, although not based on a comprehensive survey, reviews pertinent developments in the United States. It summarizes employment and related data available primarily from 1958 to 1968, and suggests information gaps which others may want to explore more fully.

A major finding concerns the changing nature of employment opportunities open to women. The number of jobs is expanding for women with technical, scientific, clerical or other specialized skills and declining for those who have limited training and are able to perform only simple and routine tasks. This development stems partially from the automation of standardized operations. Mechanization also has removed some barriers to women's employment in various activities once considered too arduous or dangerous for women. Additional influences are the occupational and industrial shifts from goods-producing to service-producing activities, caused not only by technology but also by other economic forces as well. The net effect is an ever-widening range of jobs available to women with the necessary qualifications.

This report is presented with the hope that it will help women and girls to become more aware of the challenging opportunities before them and to seek the necessary education and training. Equally important is the hope that employers, counselors, teachers, and parents will be encouraged to consider the potential contribution of women in new fields of work and to facilitate their participation.

Jean A. Wells, Special Assistant to the Director, prepared the report.

Elizabeth Duncan Koontz  
Director, Women's Bureau

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## AUTOMATION AND WOMEN WORKERS

### Introduction

The repercussions of scientific and technological progress in the United States have not seemed sufficiently different for women and men to stimulate national surveys focusing on the relationship of such advances to women's employment and conditions of work. The few studies that have been made on the effects of technology on employment cover all workers and give little consideration to any separate effects on women. This report is based, therefore, on readily available data rather than on special and comprehensive surveys. The analysis is affected by the difficulty, shared by all who attempt such a report, of separating the impact of technology from the impact of other economic forces.

The overriding evidence--which admittedly conceals important details--is a continuing upward trend in women's employment and a marked reduction in the percentage of unemployed women. These facts belie the dire predictions of persistent technological unemployment made in the late fifties and early sixties. By 1968 the number of women workers totaled 29.2 million, an increase of 32 percent over the 22.1 million in 1958. Women's unemployment rate averaged 4.8 percent in 1968--considerably reduced from their post-World War II high of 7.2 percent in 1961. This improvement in women's employment status came, it is true, during the longest period of economic growth in the history of the United States and is related to a variety of economic factors.

Men's employment, by comparison, increased 9 percent during the same 10-year period and their unemployment rate dropped to 2.9 percent in 1968 from a high of 6.4 percent in 1961. Reasons behind the larger employment increase and the smaller unemployment decrease for women than men derive largely from differences in the pattern of their work-life. Whereas virtually all able-bodied men spend their prime years in the work force, many women--during various periods of their lives--prefer to stay at home with their children or for other reasons. The labor reserve available for work force expansion, therefore, includes mainly women.

Some women--primarily married women--become intermittent workers, and the rehiring problems they often encounter tend to raise women's unemployment rate. Yet despite these differences, men's and women's comparative employment changes between 1958 and 1968 are of interest because there had been some fear that technological and scientific changes would have strongly adverse consequences for the many women who held unskilled jobs vulnerable to the inroads of automation.

The rise in women's labor force participation, from 37.1 percent in 1958 to 41.6 percent in 1968, results from other factors in addition to economic growth. It is probable that the drop in the birth rate among young women already has influenced their labor force participation. And birth rate declines among women 30 to 40 years of age suggest earlier reentry into the work force for more of them.

Job cutbacks and continuing unemployment that existed in the late fifties and early sixties did bring hardship and frustration to individual women--as well as men--who were relatively unskilled and not particularly adaptable to new work situations. The economy did not grow sufficiently fast to create all the jobs needed for new workers and for those displaced by technological changes and other factors. Subsequently, workers' adjustments have become easier as a result of more rapid economic growth and of an active manpower policy aimed at: developing workers' abilities, creating jobs which will make the most of these abilities, and matching workers and jobs.

#### Employment and Unemployment

Several major changes in the character of women's work may be related to scientific and technological progress. Of special significance is the shift in the occupational distribution of women workers. Compared with 10 years ago, relatively more women in 1968 were engaged in office and service work (excluding household work) and relatively fewer in farm, sales, and factory work. Important in this change is the long-range increase in the proportion of workers employed in service-producing industries, many of which utilize a high percentage of women employees.

In the clerical field, which has the largest number of women workers, women's employment has grown continuously. The total force of women clerical workers increased 51 percent between 1958 and 1968, as compared with an 18 percent increase for men. Computers and other automated machines have created such white-collar jobs as programmer, systems analyst, console operator, auxiliary equipment operator, and tape librarian. Although fewer women than men usually have been selected to fill these new and relatively higher skilled positions, a larger office staff often is needed for a variety of reasons. These include expanded company operations, activities which assure high quality output, and use of computers and other modern equipment to attain new services or information. Since it has been mainly expanding companies that have installed computers or purchased computer services, usually they have been able to afford the additional benefits made possible by computerization.

Within the overall expansion, some white-collar jobs are disappearing. Computers now are doing much bookkeeping, payroll, sales, invoicing, and inventory work, especially in the insurance, telephone, department store, and banking industries. As a result, there is considerably less demand for such office workers as bookkeepers, payroll clerks, calculating and tabulating machine operators, statistical typists, and file clerks. Key punch operators also are being eliminated in companies which install optical scanners.

One large group of women clerical workers, telephone operators, have been greatly affected by the installation of direct dialing equipment. From a peak of about 262,300 in 1952, the number of telephone operators employed by major telephone carriers gradually dropped to around 167,200 in 1962 and then climbed back to 193,200 by 1967. Very few permanent telephone operators had to be dismissed, because the changeover was spread over a long period of time and a wide area. Hiring for vacancies caused by the normally high turnover of young women employees was curtailed, and displaced employees were reassigned or transferred. Yet during this period there was a tremendous expansion in telephone service.

In factories, mechanization has caused virtual elimination of some of the unskilled manual jobs performed by women. For example, in the meatpacking industry, automated machinery has replaced many women who formerly were sausage stuffers, meatslicers, weighers, and packagers. Their layoff contributed largely to the 17 percent decline in women's meatpacking employment between 1960 and 1968. During the same period, men's employment in this industry decreased 10 percent.

A few manufacturing industries, such as tobacco manufacture, modernized their operations drastically and had fewer women employees in 1968 than in 1960. But despite some replacement of women by automated equipment, employment increased in many other industries, such as canning, footwear manufacture, and electrical equipment manufacture. Expanding demand for the products or services of these latter industries has obviously outweighed the influence of labor-saving machinery. Overall, the number of operatives (mostly in factories), despite a virtual standstill from 1960 to 1962, increased 34 percent for women and 18 percent for men between 1958 and 1968.

By decreasing the physical labor involved in some operations, the new technology removed some obstacles to women's employment in various jobs once considered too difficult or dangerous for women. For instance, many material handling jobs now can be performed by women with mechanical lifting trucks. Similarly, more women are employed as weavers and cardtenders by textile manufacturers who have installed modern equipment.

Reasons cited for this change are that women are considered capable of operating modern textile machinery and there is a shortage of men textile workers. Thus, even though many women formerly employed as winders, drawers, and packagers have been replaced by new machines, women's employment in this industry grew 11 percent between 1960 and 1968, while men's employment increased only 3 percent.

For women in sales occupations, the spread of self-service techniques and improved managerial practices--including the installation of machines to package and convey products--has brought some marked changes in job requirements. Some semiskilled jobs to which women might be promoted have been eliminated. A very important numerical gain for women, on the other hand, has been the growth of part-time employment opportunities in stores which have extended their hours and other customer services. The overall employment increases for salesworkers from 1958 to 1968 amounted to 22 percent for women and 14 percent for men. These job gains were relatively lower than those for all women workers but higher than for all men workers.

Women farmworkers have diminished in number at the same time that most major occupation groups have been growing. The use of machinery to plant, tend, and harvest crops has been reducing farm employment for several decades. Between 1958 and 1968 it declined 39 percent for women and 34 percent for men. Many of those displaced were unpaid family workers, since small family farms were the least adaptable to farm mechanization and frequently merged with larger farms. Some new job opportunities, however, have become available for women in field sheds, where mechanically harvested crops need to be sorted, culled, and packed as soon as possible to prevent spoilage. Higher percentages of women and youth are being employed for the relatively easy work performed in the sheds than heretofore were used for the more exhausting work in the fields.

For women in other major occupation categories as professional and service work, the influence of automation on their work has been less pronounced than for those in clerical, factory, sales, and farm jobs. In the professions, teaching machines, hospital beds controlled by the patient, automatic analyzers in health laboratories, and information storage and retrieval systems are performing some of the work formerly done by teachers, nurses, medical technologists, and librarians. Repetitive and less skilled aspects of professional jobs continue to be scrutinized for possible assignment to machines or lower skilled workers, in order to free the professionals for work that is more complicated, creative, inspirational, or personal in nature and that is increasingly in demand. Between 1958 and 1968 the number of women in professional and technical jobs rose 53 percent, almost as much as women's fastest growing major occupation group, service workers outside the home.

Entry jobs, which are typically low skilled and routine, have been a prime target for elimination by automation in some fields. Although many unskilled and semiskilled jobs still remain, the number is not sufficient to satisfy the heavy demand of young work force entrants. An estimated 24 million youth aged 16 to 21 years entered the work force between 1960 and 1969. In such industries as insurance and banking, the relative loss of low-skilled jobs has been especially hard on young women and other inexperienced and untrained entrants and may have some influence on the persistently high unemployment of teenagers. In 1968 unemployment rates averaged 15.9 percent for 16- and 17-year-old girls and 12.9 percent for 18- and 19-year-old girls, as compared with 4.8 percent for all women and girls 16 years of age and over. For both groups of teenage girls the rate of joblessness has exceeded 12 percent throughout the 1958-68 period.

Technological changes also may be partly responsible for the fact that women's highest unemployment, by occupation group, exists among those in the relatively unskilled and semiskilled jobs. In 1968 women classified as nonfarm laborers, operatives, and service workers (excluding household workers) had unemployment rates of 11.1, 6.9, and 5.1 percent, respectively.

Layoffs and dismissals of women workers were minimized by the long period required for the changeover to computerization as well as by specific measures taken. Some firms timed the installation of new machinery and the adoption of innovations to coincide with expansion of company operations. Those with job vacancies offered job transfers within the establishment or to another location--frequently at the same skill and wage level. Whenever possible, employers used normal turnover to reduce excess staff (silent firings). Often they encouraged early retirement of older workers.

Dismissal bonuses and severance pay, as well as public and private unemployment insurance benefits, helped cushion the financial hardship of job losses. Unions and management sometimes developed a package of benefits to meet individual needs. For example, women with relocation rights who are unable to move because of family responsibilities may have the alternative of receiving severance pay. The Office and Professional Employees International Union (OPEIU) developed a "model automation clause," which requires company officials: to keep employees informed of proposed technological changes, to provide training or retraining so that present employees may qualify for available positions with the company, to reassign present employees before hiring new ones, and to grant severance pay to any employees dismissed permanently.

### Vocational Guidance and Training

The declining importance of some occupations has emphasized the urgent need to update and extend vocational guidance and training provided women and girls. Through the Vocational Education Acts of 1963 and 1968, the Congress sought to update and strengthen the Federal-State vocational education system and to increase funds for improving and extending training opportunities. In addition, new opportunities for training and retraining the unemployed and the underemployed were made possible by the Manpower Development and Training Act of 1962 and a series of amendments.

Where there were employment cutbacks, some establishments provided their employees with training or retraining for jobs in other sections of the firm. Training given on company time was particularly beneficial to women workers, many of whom were married and not able to participate in courses scheduled after work. Some retraining was sponsored by unions and management jointly, as in the Armour-Packinghouse Workers' training project in the meatpacking industry.

With the expanded range of occupations opened to women by technological innovations has come the need for increased understanding by vocational counselors and guidance personnel, as well as others, that occupations need have no sex labels. The Civil Rights Act of 1964, which included a prohibition against job discrimination based on sex, gave legal impetus to women's entry into new areas of employment.

Vocational guidance for women and girls is being adapted to the new realities of the job market. These realities include the value to women of obtaining formal preparation in order to qualify for current and future job opportunities, broadening their job horizons, and understanding that a dynamic economy may require several job changes during the course of a worklife. Changing job demands emphasize the importance of individual flexibility and willingness to train for new jobs.

Advancing technology is one of the factors behind the higher educational and training requirements for many jobs. These, in turn, have contributed to women's greater interest in obtaining more education. The proportion of women workers 18 to 64 years of age with at least a high school education increased from 60.6 percent in 1962 to 67.4 percent in 1968. Each year in the sixties, there were increasingly higher proportions of women who completed high school, who went on to college, and who earned a degree from an institution of higher education.

### Training and Retraining of Older Women

Because of scientific and technological changes, many older women interested in seeking paid employment found it necessary to resume their education and training. This was necessary to help them prepare for new jobs, new work methods, or other developments. Their enrollment in all types of educational institutions has increased significantly, rising between 1950 and 1967 from 47,000 to 375,000 for women 25 to 34 years of age. (Figures are not available for persons 35 years of age and over.) Much of the increase also is related to the larger numbers of mature women interested in reentering the world of work after a period of homemaking. With obsolete skills, often limited education, and usually little self-confidence, older women reentrants have sought training courses and continuing education programs adapted to their special needs and circumstances.

In response to requests from these women, universities and colleges primarily, but also some community colleges, high schools, women's organizations, and other groups established special programs to help them improve their skills and qualify for employment. Most of the special programs include counseling assistance. Supportive services offered and training skills taught have varied considerably, in accordance with the labor market demands and the interests of women in specific areas. Training programs financed by the Federal Government, mentioned previously, are available also to mature women.

### Remuneration

In the absence of extensive surveys, it is difficult to determine whether automation has had any immediate impact on women's wages. Certainly, the somewhat smaller percentage of low-skilled work now performed by women means relatively fewer low-paying jobs and thus an upward push on women's wage levels. Another upward influence is the employment of women in some of the new jobs created by modern technology, many at skill levels above those of the work made obsolete. Instances where women replaced by machines were downgraded to lower paying jobs have been reported only rarely. However, some discharged women, especially those in small towns that have limited employment opportunities, have accepted jobs at lower wages in other firms.

The Equal Pay Act of 1963 has contributed toward raising women's wage levels by requiring men and women employed in interstate commerce to receive equal pay for equal work. Thus, women able to obtain jobs made physically easier by automation or jobs with higher skills must receive the same wage rates as men, where they are covered by the Federal law or by State equal pay laws.

### Hours of Work and Leisure

The fruits of the notable increase in productivity in this country, made possible in large part by technological change, have been shared by women and men workers through fewer hours of work and more leisure time as well as higher pay. Over many years workers have benefited from progressively shorter work schedules, longer vacation periods, more paid holidays, and earlier retirement with pay.

There has been no unusually pronounced shortening of the workweek in the last 10 years, however. Weekly hours of production and nonsupervisory workers on private payrolls averaged 37.8 in 1968, only slightly less than the 38.5 hours averaged in 1958.

Among the major occupation groups, women clerical workers in 1968 averaged 39.1 hours, the shortest workweek for women working full-time schedules. Women operatives, another group which has been significantly affected by technological progress, averaged the next shortest workweek (39.3 hours). The occupation group of women with the longest workweek (47.2 hours) was composed of managers, officials, and proprietors, many of whom are self-employed.

During the early sixties there was some pressure to reduce hours of work, largely to offset displacement effects of automation. For example, the major officeworkers' union, which had already obtained a 35-hour workweek in some offices in large metropolitan areas, undertook a campaign in behalf of a 4-day 32-hour week to help decrease technological unemployment.

The shorter workweek has brought with it an increase in the amount of leisure time available to workers. Also of significance was the lowering of the retirement age from 65 to 62 years (in 1956 for women and in 1961 for men), at reduced pay, for workers covered by the federally administered old-age insurance program. In addition, some private pension plans sponsored by employers and/or unions have been changed so that the permissible age of retirement is lower. Some have added supplemental benefits to encourage early retirement. The net effect has been to increase substantially the number of women and men workers able to spend the latter part of their lives at leisure with financial support.

### Safety and Health

The influence of technological developments on the health and safety of women workers has been varied and complex, depending upon the individual circumstances. The major advantages--that workplaces are more pleasant and cleaner and that there are fewer dirty, arduous, and physically fatiguing jobs--have, of course, had a beneficial effect on women's health. In addition, safeguards normally are built into automated machinery and equipment, thus improving safety conditions for women workers.

But much of the high-speed machinery has increased the noise level in factories. Some workers, including women, have reported greater nervous tension and psychological fatigue, because of the care and accuracy needed in handling expensive equipment as well as in performing detailed, fast-paced operations. There are also hazards in working with new chemicals and new processes. In workplaces where just a few workers are able to handle a considerable number of machines or laborsaving devices, there are also some complaints of isolation and resentment at the monotony associated with continuous processing.

Fear of displacement by the installation of automated machinery has tended to affect the mental health of some workers, especially in places and during periods of labor surplus. This fear was alleviated by employers who discussed future plans with their workers, gave early warning of any expected layoffs, and offered such assistance as job transfers, retraining, and/or some financial compensation. The network of public employment offices located throughout the country also assisted workers in obtaining employment--and tended to encourage geographic mobility of workers.

#### Child Care

Technological advances appear to have had virtually no influence on the provision of child care in the United States. Despite the rising number of working mothers in the enlarging work force and their urgent need for child care services, there is a severe shortage of child care facilities. Fortunately the need to establish more adequate and extensive child care facilities now claims nationwide attention. Some of the interest can be traced to the public desire to help women utilize their talents and energies, both to satisfy their own needs and aspirations and to become part of the growing labor force of a dynamic economy. The more immediate stimulant to the child care movement is the desire to provide the supportive services needed by employable adults on welfare, thus enabling them to participate in job training and employment and ultimately to attain economic independence. There is a growing recognition of the need to improve education and social experiences of children during their early formative years.

#### Conclusion

There is no doubt that women's employment opportunities and status improved considerably between 1958 and 1968, although it is difficult to determine how much of the improvement came from technological progress and how much from other factors. And it is also true that some women were experiencing unemployment and economic hardship at the same time that most women were receiving such benefits as more skilled jobs,

higher pay, and better working conditions. An overall review of events relating to technological developments supports the general conclusion that the employment outlook is favorable for women with technical, scientific, clerical, or other specialized skills, but much less optimistic for those with limited training and able to perform only simple and routine tasks.

In a dynamic economy, some jobs are always being abolished and new ones being developed. And these changes sometimes result in layoffs at the same time that new hires are taking place. It has been found essential, therefore, for up-to-date counseling and adequate training facilities to be provided in order to enable workers to learn about and qualify for emerging jobs. A concerned and imaginative society can and must find ways to respond favorably to the technological advances needed for increased output and efficient production.

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